CLAIMS

What is claimed is:

1. A method of hermetically sealing a ceramic and metal component assembly for implantation in living tissue, comprising the steps of:

selecting a ceramic part;

selecting a metal part;

selecting an essentially pure interlayer material that is compatible with said ceramic part, said essentially pure interlayer material being one which forms a eutectic alloy with said metal part, said eutectic alloy consisting of metals of said metal part and said interlayer material and having a eutectic melting point temperature that is lower than the respective melting points of said metal or of said pure interlayer material;

positioning said pure interlayer material between said ceramic part and said metal part;

applying a force to said ceramic part and said metal part to place said pure interlayer material in compression, thereby creating intimate contact between said ceramic part, said metal part and said pure interlayer material;

placing the assembly in a non-reactive atmosphere;

heating the assembly to a bonding temperature between said eutectic melting point and said melting point of said metal;

holding the assembly at said bonding temperature for a predetermined time to form a bond between said ceramic part and said metal part; and

cooling the assembly.

2. The method of claim 1 wherein said force creates compression between 2 and 500 psi.

3. The method of claim 1 wherein said force creates compression between 2 and 7 psi.

4. The method of claim 1 wherein said ceramic part is selected from the group consisting of alumina, titania, zirconia, stabilized-zirconia, partially-stabilized zirconia, tetragonal zirconia, magnesia-stabilized zirconia, ceria-stabilized zirconia, yttria-stabilized zirconia, and calcia-stabilized zirconia.

5. The method of claim 1 wherein said metal part is selected from the group consisting of titanium and its alloys.

6. The method of claim 1 wherein said metal part is comprised of Ti-6Al-4V.

7. The method of claim 1 wherein said essentially pure interlayer material is comprised of pure nickel.

8. The method of claim 1 wherein said essentially pure interlayer material is approximately 0.002 inches or less thick foil.

9. The method of claim 1 wherein said essentially pure interlayer material is applied chemically.

10. The method of claim 1 wherein said essentially pure interlayer material is applied thermally.

11. The method of claim 1 wherein said essentially pure interlayer material is in the form of metallic beads.

12. The method of claim 1 wherein said essentially pure interlayer material is in the form of metallic powder.

13. The method of claim 1 wherein said non-reactive atmosphere is a vacuum

between approximately 10^{-6} to 10^{-7} torr.

14. The method of claim 1 wherein said bonding temperature is between approximately 1728° to 2012° F.

15. The method of claim 1 wherein said predetermined time is between approximately 5 and 60 minutes.

16. The method of claim 1 additionally comprising the step of cleaning said component assembly after bonding to remove toxic materials that are harmful to living tissue.

17. The method of claim 16 additionally comprising the step of cleaning said component assembly after bonding by placing it in an acid bath.

18. The method of claim 16 wherein said toxic materials are nickel and nickel salts.

19. A method of bonding a Ti-6Al-4V metal part to a ceramic part making a hermetically sealed component assembly for implantation in living tissue, comprising the steps of:

selecting a ceramic part from the group consisting of biocompatible and corrosion resistant ceramics;

positioning an essentially pure nickel foil between said ceramic part and said Ti-6Al-4V metal part;

applying a force to said ceramic part and said metal part so as to place said pure nickel foil in compression;

placing said component assembly in a non-reactive atmosphere;

heating said component assembly to between approximately 1728° and 2012° F for between approximately 5 and 60 minutes; and

cooling said component assembly.

20. A method of bonding a ceramic part to a metal part to form a component assembly for placement in living tissue in which an interlayer material is placed between the two parts to be bonded, applying a compressive force of 2 to 500 psi to said ceramic part and said metal part so as to place said interlayer material in compression to form intimate contact between said ceramic part, said metal part and said interlayer material, said interlayer material being a metal which forms a eutectic alloy with said metal part, said eutectic alloy consisting of metals comprising said metal part and said interlayer material and having a eutectic temperature that is lower than the melting point of said metal or of said interlayer material, and in which said component assembly, comprising said ceramic part, said metal part and said pure interlayer material, is placed at a bonding temperature, for a predetermined time, that is less than the melting point of said metal part, said ceramic part or said interlayer material, but where said bonding temperature is greater than the melting point temperature of said eutectic alloy, selecting said ceramic part from the group consisting of alumina, titania, zirconia, stabilized-zirconia, partially-stabilized zirconia, tetragonal zirconia, magnesia-stabilized zirconia, ceria-stabilized zirconia, yttria-stabilized zirconia, and calcia-stabilized zirconia, selecting said metal part from the group consisting of titanium and titanium alloys, wherein the improvement comprises:

selecting said interlayer material to be essentially pure nickel; and

selecting said bonding temperature between approximately 1728° and 2012° F.